Name: _____   Date: _____
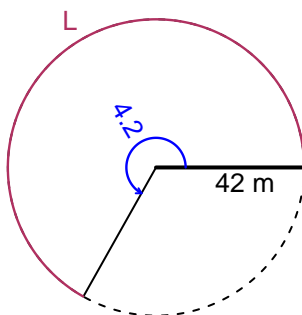
Trig Final (SLTN v607)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 4.2 radians. The radius is 42 meters. How long is the arc in meters?
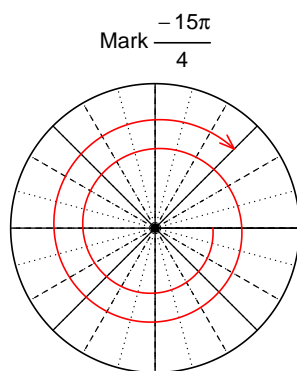

$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$
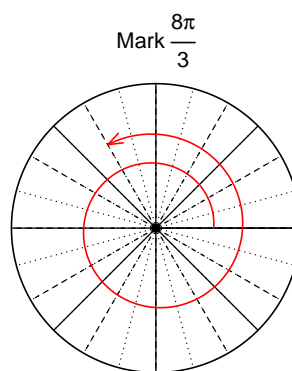
$L = 176.4$ meters.

Question 2

Consider angles $\frac{-15\pi}{4}$ and $\frac{8\pi}{3}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-15\pi}{4}\right)$ and $\sin\left(\frac{8\pi}{3}\right)$ by using a unit circle (provided separately).

Mark $\dfrac{-15\pi}{4}$

Find $\cos(-15\pi/4)$

Mark $\dfrac{8\pi}{3}$
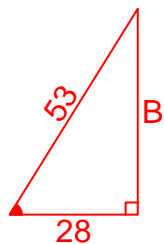
Find $\sin(8\pi/3)$

$\cos(-15\pi/4) = \frac{\sqrt{2}}{2}$

$\sin(8\pi/3) = \frac{\sqrt{3}}{2}$

1

Question 3

If $\cos(\theta) = \frac{28}{53}$, and θ is in quadrant IV, determine an exact value for $\sin(\theta)$.
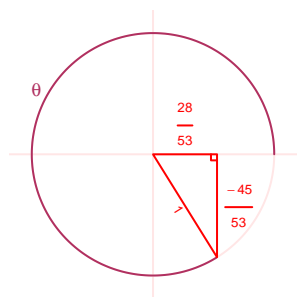
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.

Solve the Pythagorean Equation

$$28^2 + B^2 = 53^2$$
$$B = \sqrt{53^2 - 28^2}$$
$$B = 45$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant IV in a unit circle.

$$\sin(\theta) = \frac{-45}{53}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = 2.35$ meters, a frequency of 5.24 Hz, and an amplitude of 8.56 meters. At $t = 0$, the mass is at the maximum height. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 8.56 \cos(2\pi 5.24t) + 2.35$$

or

$$y = 8.56 \cos(10.48\pi t) + 2.35$$

or

$$y = 8.56 \cos(32.92t) + 2.35$$